

## WHAT IS CLAIMED IS:

1. A method of increasing sensitivity of stem cells to a chemoattractant, the method comprising exposing the stem cells to HGF or an active portion thereof, which is capable of increasing a level of at least one chemoattractant receptor of the stem cells to thereby increase the sensitivity of the stem cells to the chemoattractant.
2. The method of claim 1, wherein said at least one chemoattractant receptor is CXCR4.
3. The method of claim 1, further comprising exposing the stem cells to a growth factor and/or a cytokine.
4. The method of claim 3, wherein said growth factor and/or cytokine are selected from the group consisting of SCF and IL-6.
5. The method of claim 1, wherein the stem cells are hematopoietic stem cells.
6. The method of claim 5, wherein said hematopoietic stem cells are CD34<sup>+</sup> hematopoietic stem cells.
7. The method of claim 6, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>low</sup> hematopoietic stem cells.
8. The method of claim 1, wherein the stem cells are mesenchymal stem cells.
9. The method of claim 1, wherein said exposing the stem cells to said HGF or said active portion thereof, is effected by:
  - (i) expressing a polynucleotide encoding said HGF or said active portion thereof in the stem cells; and/or
  - (ii) contacting the stem cells with said HGF or said active portion thereof.

10. The method of claim 1, further comprising exposing the stem cells to HGF-receptor.

11. A method of treating a disorder requiring cell or tissue replacement, the method comprising providing to a subject in need thereof a therapeutically effective amount of stem cells treated with HGF or an active portion thereof, which is capable of increasing a level of at least one chemoattractant receptor of said stem cells, thereby treating the disorder requiring cell or tissue replacement in the subject.

12. The method of claim 11, wherein said at least one chemoattractant receptor is CXCR4.

13. The method of claim 11, further comprising treating said stem cells with a growth factor and/or a cytokine being capable of increasing said level of said at least one chemoattractant receptor of the stem cells.

14. The method of claim 13, wherein said growth factor and/or cytokine are selected from the group consisting of SCF and IL-6.

15. The method of claim 11, wherein said stem cells are hematopoietic stem cells.

16. The method of claim 15, wherein said hematopoietic stem cells are CD34<sup>+</sup> hematopoietic stem cells.

17. The method of claim 16, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>low</sup> hematopoietic stem cells.

18. The method of claim 11, wherein said stem cells are mesenchymal stem cells.

19. A method of treating a disorder requiring cell or tissue replacement, the method comprising providing to a subject in need thereof a therapeutic effective amount of HGF or an active portion thereof, which is capable of increasing a level of at least one chemoattractant receptor of stem cells, thereby treating the disorder requiring cell or tissue replacement.
20. The method of claim 19, wherein said at least one chemoattractant receptor is CXCR4.
21. The method of claim 19, further comprising providing to said subject in need thereof a therapeutic effective amount of a growth factor and/or a cytokine being capable of increasing said level of said at least one chemoattractant receptor of stem cells.
22. The method of claim 21, wherein said growth factor and/or cytokine are selected from the group consisting of SCF and IL-6.
23. The method of anyone of claims 19 to 22, further comprising providing stem cells to said subject in need thereof.
24. The method of claim 23, wherein said stem cells are CD34<sup>+</sup> hematopoietic stem cells.
25. The method of claim 24, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>low</sup> hematopoietic stem cells.
26. The method of claim 19, wherein said stem cells are mesenchymal stem cells.
27. Use of HGF or an active portion thereof for the manufacture of a medicament for increasing homing of stem cells to a target tissue.

28. The use of claim 27, wherein said stem cells are hematopoietic stem cells.
29. The use of claim 28, wherein said hematopoietic stem cells are CD34<sup>+</sup> hematopoietic stem cells.
30. The use of claim 29, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>-low</sup> hematopoietic stem cells.
31. The use of claim 27, wherein said stem cells are mesenchymal stem cells.
32. The use of claim 27, wherein said target tissue is selected from the group consisting of bone marrow, blood vessel, heart, lung, liver, pancreas, kidney, nervous system, skin, bone and skeletal muscle.
33. The use according to anyone of claims 27 to 32 further comprising a growth factor and/or a cytokine.
34. The use according to claim 33 wherein said growth factor and/or cytokine are selected from the group consisting of SCF and IL-6.
35. The use according to claim 34 wherein the growth factor is SCF.
36. A method of generating stem cells suitable for transplantation, the method comprising:
- (a) collecting stem cells;
  - (b) exposing said stem cells to HGF or an active portion thereof; and
  - (c) isolating stem cells having CXCR4 levels above a predetermined threshold, to thereby generate stem cells suitable for transplantation.
37. The method of claim 36, wherein collecting said stem cells is effected by:
- (i) a stem cell mobilization procedure; and/or

(ii) a surgical procedure.

38. The method of claim 36, further comprising exposing said stem cells to a growth factor and/or a cytokine capable of increasing expression of CXCR4.

39. The method of claim 38, wherein said growth factor and/or cytokine are selected from the group consisting of SCF and IL-6.

40. The method of claim 36, wherein said stem cells are hematopoietic stem cells.

41. The method of claim 40, wherein said hematopoietic stem cells are CD34<sup>+</sup> hematopoietic stem cells.

42. The method of claim 41, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>low</sup> hematopoietic stem cells.

43. The method of claim 36, wherein said stem cells are mesenchymal stem cells.

44. The method of claim 36, wherein said exposing said stem cells to said HGF or said active portion thereof, is effected by:

- (i) expressing a polynucleotide encoding said HGF or an active portion thereof in said stem cells; and/or
- (ii) contacting said stem cells with said HGF or an active portion thereof.

45. The method of claim 36, wherein said isolating stem cells having CXCR4 levels above said predetermined threshold is effected by FACS.

46. The method of claim 45, further comprising determining homing capabilities of said stem cells having CXCR4 levels above said predetermined threshold following step (c).

47. A stem cell comprising a nucleic acid construct comprising a first polynucleotide sequence encoding HGF or an active portion thereof and an inducible cis-acting regulatory element for directing expression of said polynucleotide in cells and a second polynucleotide sequence being translationally fused to said first polynucleotide sequence, said second polynucleotide sequence encoding a signal peptide capable of directing secretion of said HGF or said active portion thereof out of said cells.

48. The stem cell of claim 47, further comprising a third polynucleotide sequence encoding a cytokine or a growth factor selected from the group comprising IL-6 and SCF.

49. The stem cell of claim 48, comprising a third polynucleotide being SCF.

50. The stem cell of anyone of claims 47 to 49, wherein said stem cells are hematopoietic stem cells.

51. A cell-line comprising stem cells transformed to express an exogenous polynucleotide encoding HGF or an active portion thereof.

52. The cell-line of claim 50 or 51, wherein said stem cells are hematopoietic stem cells.

53. The cell-line of claim 52, wherein said hematopoietic stem cells are CD34<sup>+</sup> hematopoietic stem cells.

54. The cell-line of claim 53, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>low</sup> hematopoietic stem cells.

55. The cell-line of claim 52, wherein said stem cells are mesenchymal stem cells.
56. A cell culture comprising:
- (i) stem cells; and
  - (ii) feeder cells expressing HGF or an active portion thereof each being capable of increasing a level of at least one chemoattractant receptor of said stem cells.
57. The cell culture of claim 56, wherein said stem cells are hematopoietic stem cells.
58. The cell culture of claim 57, wherein said hematopoietic stem cells are CD34<sup>+</sup> hematopoietic stem cells.
59. The cell culture of claim 58, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>low</sup> hematopoietic stem cells.
60. The cell culture of claim 56, wherein said stem cells are mesenchymal stem cells.
61. A method of increasing sensitivity of stem cells to a chemoattractant, the method comprising, upregulating an expression or activity of endogenous HGF or an active portion thereof of the stem cells to thereby increase the sensitivity of the stem cells to the chemoattractant.
62. A method of increasing stem cell motility, the method comprising exposing the stem cells to HGF or an active portion thereof which is capable of increasing motility of the stem cells.
63. The method of claim 62, further comprising exposing the stem cells to a growth factor and/or a cytokine.

64. The method of claim 63, wherein said growth factor and/or cytokine are selected from the group consisting of SCF and IL-6.
65. The method of claim 64 wherein the cytokine is SCF.
66. The method of claim 62, wherein the stem cells are hematopoietic stem cells.
67. The method of claim 66, wherein said hematopoietic stem cells are CD34<sup>+</sup> hematopoietic stem cells.
68. The method of claim 67, wherein said hematopoietic stem cells are CD34<sup>+</sup>/CD38<sup>-low</sup> hematopoietic stem cells.
69. The method of claim 62, wherein the stem cells are mesenchymal stem cells.
70. The method of claim 62, wherein said exposing the stem cells to said HGF or said active portion thereof, is effected by:
- (i) expressing a polynucleotide encoding said HGF or said active portion thereof in the stem cells; and/or
  - (ii) contacting the stem cells with said HGF or said active portion thereof.
71. A method of facilitating self repopulation and/or self engraftment to an injured organ in a subject suffering of organ inflammation and/or injury, comprising administration of HGF or an active portion thereof which is capable of increasing motility of the stem cells.]
72. A method of facilitating self repopulation and/or self engraftment according to claim 71, further comprising SCF.
73. A pharmaceutical composition comprising HGF or an active portion thereof which is capable of increasing motility of the stem cells and SCF.



74. A pharmaceutical composition of claim 73, for treating a disorder requiring cell or tissue replacement.